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2734 17 Avenue SW,
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+15878858911
editorial-office@sciformat.ca

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GASTROINTESTINAL ACCESS FOR ENTERAL NUTRITION IN CANCER PATIENTS: INDICATIONS, METHOD SELECTION, AND COMPLICATIONS

Aleksandra Kwiatkowska (Corresponding Author, Email: olakwiatkowska1712@gmail.com)
Voivodeship Specialist Hospital in Częstochowa – Trauma Center, Częstochowa, Poland
ORCID ID: 0009-0006-0873-6364

Michał Becelewski
Dr. Emil Cyran Provincial Neuropsychiatric Hospital in Lubliniec, Poland
ORCID ID: 0009-0008-1505-6150

Karolina Zygoń-Komendarczyk
Municipal Hospital in Siemianowice Śląskie, Siemianowice Śląskie, Poland
ORCID ID: 0009-0005-9916-0972

Dominik Woźniak
Bonifraterskie Medical Center, Kraków, Poland
ORCID ID: 0009-0006-1795-8620

Mikołaj Dubiel
Independent Public Health Care Institution of the Ministry of Interior Affairs and Administration in Kraków, Poland
ORCID ID: 0009-0009-0785-6681

Sylvia Sanakiewicz
Independent Public Health Care Institution of the Ministry of Interior Affairs and Administration in Kraków, Poland
ORCID ID: 0009-0008-2703-4098

Patryk Obajtek
Independent Public Health Care Institution of the Ministry of Interior Affairs and Administration in Kraków, Poland
ORCID ID: 0009-0006-2811-2348

ABSTRACT

Enteral nutrition is an integral component of comprehensive oncological treatment. This narrative review aimed to present indications for nutritional therapy in cancer patients and the principles guiding the selection of gastrointestinal access routes for enteral feeding. PubMed and Google Scholar were searched for relevant publications published between 2000 and March 2026, with particular emphasis on international guidelines and clinically relevant studies. The review summarizes the characteristics, indications, and complications of the most commonly used access methods, including nasogastric and nasojejunal tubes, percutaneous endoscopic gastrostomy (PEG), PEG with jejunal extension (PEG-J), direct percutaneous endoscopic jejunostomy (DPEJ), and surgical jejunostomy. Malnutrition remains a frequent and clinically significant problem in oncology, negatively affecting treatment tolerance, quality of life, and survival. When gastrointestinal function is preserved, enteral nutrition should be considered the preferred method of nutritional support. Appropriate selection of gastrointestinal access is essential for safe and effective nutritional therapy and reflects the growing role of medical technology and interdisciplinary collaboration in modern cancer care.

KEYWORDS

Enteral Nutrition, Gastrointestinal Access, PEG, Oncology Patients, Clinical Nutrition, Medical Technology

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Introduction

Cancer represents one of the greatest challenges of modern medicine, both in Poland and worldwide. The International Agency for Research on Cancer (IARC) estimates that one in five individuals will develop cancer during their lifetime. According to global statistics, approximately 20 million new cancer cases and 9.7 million cancer-related deaths were reported in 2022 (Bray et al., 2024).

One of the most significant clinical problems affecting cancer patients is malnutrition. The World Health Organization (WHO) defines malnutrition as “an imbalance between nutrient and energy requirements and intake that allows for growth, maintenance of vital functions, and the performance of specific physiological functions” (World Health Organization et al., 2006). It is estimated that weight loss may occur in up to 80% of patients with certain malignancies, particularly cancers of the gastrointestinal tract and pancreas.

The scale of this problem affects not only treatment outcomes but also patients’ quality of life and daily functioning (Szczepanik et al., 2010). Impaired nutritional status is associated with an increased incidence of complications, a weaker response to oncological treatment compared with well-nourished patients, and shorter survival times (Kapła, 2018).

The European Society for Clinical Nutrition and Metabolism (ESPEN) emphasizes that approximately 10–20% of patients diagnosed with cancer die as a result of malnutrition rather than the cancer itself. These data clearly indicate that nutritional therapy should not be considered an additional element of care but rather an integral component of comprehensive cancer treatment (Muscaritoli et al., 2021).

Materials and Methods

A narrative literature review was conducted to summarize current knowledge regarding gastrointestinal access for enteral nutrition in oncology patients. Scientific databases including PubMed and Google Scholar were systematically searched for relevant publications.

The search included articles published between 2000 and March 2026 using keywords such as “enteral nutrition”, “gastrointestinal access”, “PEG”, “jejunal feeding”, and “oncology patients”.

Publications were selected based on their relevance to clinical practice, with particular emphasis on international guidelines, including those from the European Society for Clinical Nutrition and Metabolism (ESPEN) and the European Society of Gastrointestinal Endoscopy (ESGE).

Review articles, clinical studies, and official recommendations addressing indications, techniques, and complications of enteral access in cancer patients were included. Approximately 30 key publications were analyzed to synthesize current recommendations and clinical approaches.

In addition to database searching, a manual screening of reference lists from selected articles was performed to identify additional relevant publications. Preference was given to studies with direct clinical applicability, including randomized controlled trials, systematic reviews, and international guidelines.

The selection process was based on a qualitative assessment of relevance rather than strict inclusion and exclusion criteria, which is characteristic of narrative reviews. Particular attention was paid to studies describing indications, contraindications, technical aspects, and complications associated with various enteral access methods.

Although this review does not follow a systematic review protocol, efforts were made to ensure a comprehensive and balanced representation of current knowledge. The inclusion of both clinical studies and expert guidelines allowed for the integration of evidence-based recommendations with practical clinical considerations.

A limitation of this approach is the potential for selection bias and the lack of quantitative synthesis. However, the narrative methodology enables a broader discussion of clinical context, which is particularly relevant in multidisciplinary fields such as oncological nutritional therapy.

Results

Characteristics of Access Routes for Enteral Nutrition

According to the definition proposed by the Polish Society for Parenteral, Enteral Nutrition and Metabolism (PTŻPDiM), nutritional therapy refers to the administration of energy, protein, electrolytes, trace elements, and vitamins in the form of intravenous preparations or commercial enteral formulas in patients who cannot meet their nutritional requirements through normal oral intake due to the nature of the underlying disease or disease-related cachexia (Spodaryk, 2019).

The selection of an appropriate nutritional therapy method depends primarily on the function and patency of the gastrointestinal tract. If enteral nutrition is feasible, the next step is to select the optimal access route depending on clinical indications and the anticipated duration of therapy. Potential complications associated with specific methods should also be taken into account.

The location of artificial access strongly correlates with the functional capacity of individual segments of the gastrointestinal tract. Appropriate selection of the access route facilitates proper digestion and absorption of nutrients, ensuring optimal effectiveness of nutritional therapy (Wierdak et al., 2022).

Various types of enteral feeding tubes are used to administer specialized enteral formulas. These tubes are inserted either through natural openings, such as the nostril or mouth, or through a surgically or endoscopically created stoma. One end of the tube is positioned within the gastrointestinal tract, while the other remains outside the body, allowing administration of the enteral formula.

Enteral feeding tubes can be divided into several main categories.

Nasogastric and Nasojejunat Tubes

Nasogastric and nasojejunat tubes are thin, flexible tubes with smooth surfaces that allow passage through the esophagus to the stomach (nasogastric tubes, NG) or into the small intestine beyond the ligament of Treitz (nasojejunat tubes, NJ). These tubes are typically made of polyurethane or silicone. Their rounded and soft tip reduces the risk of pressure-related mucosal injury within the gastrointestinal tract.

For stabilization, the external part of the tube is secured to the patient's nose or cheek. Tubes differ in both length and diameter. Diameter is expressed in the French scale and usually ranges from 8 to 16 Fr in adults, where 1 French unit corresponds to 0.33 mm.

The appropriate tube length depends on the intended location of the distal tip. A balanced approach should be taken when selecting tube size. A thinner tube reduces the risk of tissue trauma but increases the risk of tube obstruction caused by enteral formula residue. Tubes intended for gastric or duodenal placement typically measure 90–110 cm, whereas those intended for small intestinal placement are usually 110–130 cm long. Placement of a tube in the small intestine is typically performed under radiological or endoscopic guidance (Matras & Kunecki, 2016).

Endoscopic Access Routes – PEG, PEG-J and DPEJ

In patients requiring long-term enteral nutrition, whether in hospital or at home, stoma tubes such as gastrostomy, jejunostomy, or gastrojejunostomy should be considered.

Percutaneous endoscopic gastrostomy (PEG) is currently the standard method for long-term enteral feeding. This technique was introduced into clinical practice in the 1980s as a minimally invasive alternative to surgical gastrostomy, allowing access to the stomach without the need for laparotomy.

PEG is performed under local anesthesia and is considered a safe and relatively comfortable procedure for patients. It can be carried out in endoscopy units and, in selected cases, at the patient's bedside.

PEG may be placed using several endoscopic techniques, most commonly the pull method (Gauderer–Ponsky technique) or the push method (Sacks–Vine technique). However, the choice of technique does not significantly influence the indications for gastrostomy placement.

PEG-J is a modification of PEG in which a jejunal extension tube is inserted through the gastrostomy and advanced beyond the pylorus. This approach is used, for example, in patients with pyloric obstruction or severe gastroparesis.

Direct percutaneous endoscopic jejunostomy (DPEJ) provides direct access to the jejunum. It is most often performed in cancer patients after total gastrectomy or in cases where PEG-J placement is not feasible or the jejunal extension becomes displaced (Bazaliński & Barańska, 2006).

A PEG device consists of four main components: the tube, the internal retention device (internal bumper or flange), the external fixation plate, and the external port. The tube, or gastrostomy catheter, passes through the abdominal wall into the stomach. It is typically 12–24 Fr in diameter and is made of silicone or polyurethane.

Silicone tubes are softer and more flexible than polyurethane tubes, which are generally stiffer and more durable. However, silicone tubes demonstrate greater biocompatibility and carry a lower risk of allergic reactions. Therefore, they are more frequently used in long-term gastrostomy.

The internal retention device prevents accidental dislodgement of the PEG and stabilizes the tube within the stomach. It may be shaped like a disk or umbrella. In some cases, balloon-retained tubes are used instead of a rigid internal bumper. Balloon systems allow the tube to be removed easily for cleaning or replacement.

The balloon is filled with sterile or distilled water. This solution is commonly used after the gastrostomy tract has matured and is particularly useful in long-term care patients requiring frequent tube replacement.

Stabilization is additionally provided by the external fixation plate, which secures the tube against the skin. The external port is equipped with a valve, usually made of polycarbonate or polypropylene, allowing connection to a feeding pump, gravity feeding set, or syringe. ENFit connector systems are commonly used to prevent incorrect connections (Szumilak et al., 2021; Zmarzły, 2017).

Depending on the design of the external component, PEG systems can be classified as high-profile or low-profile devices. High-profile tubes are most commonly used immediately after gastrostomy placement and provide greater stability during continuous feeding. Low-profile devices are typically used after the tract has healed and offer improved comfort, reduced risk of accidental dislodgement, and better cosmetic outcomes. The choice of device should consider the patient's clinical condition, anticipated duration of therapy, and level of daily activity (Szumilak et al., 2021).

Surgical Access Routes – Jejunostomy and Microjejunostomy

Patients who cannot undergo endoscopic access placement, most commonly due to mechanical obstruction such as a tumor, may require surgical access.

Permanent surgical access is most commonly created in the small intestine in the form of a jejunostomy. This procedure may be performed as part of radical oncological surgery or as a palliative intervention, for example in patients with unresectable gastric cancer, to enable early enteral nutrition.

The procedure involves direct suturing of the feeding tube to the intestinal wall followed by fixation of the jejunum to the abdominal wall. Compared with endoscopic techniques, surgical access is associated with a higher risk of complications.

Surgically placed jejunostomy tubes can be inserted using the Witzel technique or through an isolated Roux-en-Y loop. Equipment required for a classic jejunostomy includes a surgical instrument set, absorbable and non-absorbable sutures, and a feeding jejunostomy tube.

The tube is typically similar in size to a PEG tube and usually measures 12–14 Fr in diameter. These tubes are typically made of silicone or polyurethane and feature an atraumatic tip with lateral drainage holes. A radiopaque line serves as an integral marker enabling radiological verification of tube position.

Needle catheter jejunostomy (NCJ), also referred to as microjejunostomy, utilizes thin silicone or polyurethane catheters with a diameter of approximately 6–8 Fr. These catheters are inserted directly through the abdominal wall and secured to the skin using a fixation plate. Placement is performed using a dedicated Seldinger-type kit with a J-tip guidewire. Both types of surgical enteral access are compatible with the ENFit connector system (Szumilak et al., 2021; Ziemiański & Lisik, 2020).

Indications According to Clinical Situation

The selection of the appropriate feeding method depends primarily on gastrointestinal function and patency, as well as the anticipated duration of nutritional therapy. If the gastrointestinal tract cannot be used, the patient should be qualified for parenteral nutrition. When gastrointestinal function is preserved, enteral nutrition remains the preferred method.

Another important factor influencing the choice of access route is the expected duration of nutritional support. Additional factors include the risk of aspiration, the patient's overall and metabolic condition, and the nature and location of the underlying malignancy.

Indications for Nasogastric and Nasojejunal Feeding

Nasogastric or nasojejunal feeding is considered when short-term nutritional therapy is anticipated. These tubes are typically recommended when nutritional intervention is expected to last approximately 4–6 weeks and oral intake is not possible despite preserved gastrointestinal function.

Nasogastric tubes are preferred in patients with normal gastric function and a low risk of aspiration. In contrast, nasojejunal tubes are recommended in patients with a high risk of aspiration of gastric contents, gastroparesis, pyloric obstruction, or after gastric surgery.

Common indications include:

Head and neck cancers – nutritional support is initiated due to tumors mechanically obstructing the upper digestive tract, complications of radiotherapy such as mucositis, or cranial nerve damage. This group includes cancers of the pharynx, larynx, oral cavity, and nasopharynx.

Esophageal cancer – progressive dysphagia is a common symptom in these patients. Nasogastric tube feeding may help correct nutritional deficiencies.

Gastric cancer – enteral tube feeding may be used in patients with severe postoperative complications in order to improve their overall condition.

Pancreatic cancer – feeding tubes may be required in cases of duodenal obstruction, cancer cachexia, or complications of oncological treatment (Bossola et al., 2022; Nugent et al., 2013).

Endoscopic Access – PEG, PEG-J and DPEJ

In cancer patients expected to require nutritional support for longer than four weeks, percutaneous access should be considered depending on the clinical situation. ESGE guidelines emphasize the stomach as the preferred route whenever possible.

Contraindications to PEG include abnormal gastric anatomy, severe gastroparesis, and a high risk of aspiration. Eligibility criteria also include the absence of ascites and the absence of tumor infiltration in the abdominal wall at the intended insertion site.

Patients who may benefit from PEG include those with head and neck or esophageal cancer presenting with severe mechanical dysphagia or painful odynophagia, as well as patients with central nervous system tumors accompanied by cancer cachexia.

PEG-J is used in patients who develop recurrent vomiting during gastric feeding. Massive ascites with preserved access to the small intestine, previous total gastrectomy, or gastric tumors preventing PEG placement constitute indications for direct endoscopic jejunostomy (Muscaritoli et al., 2021).

Surgical Access – Jejunostomy and Microjejunostomy

The choice of nutritional access should be made by an interdisciplinary team that may include a surgeon, oncologist, and clinical dietitian. The experience of the medical center is also an important factor when selecting surgical access.

Jejunostomy or microjejunostomy should be considered when gastric feeding is poorly tolerated or when gastric access cannot be established. Studies have shown that post-pyloric enteral feeding is associated with a lower incidence of aspiration pneumonia compared with gastric feeding (Sobocki et al., 2025).

Indications include upper gastrointestinal malignancies causing mechanical obstruction or dysphagia. Jejunostomy is also frequently performed prophylactically during major oncological procedures such as total gastrectomy. The aim is not only to reduce the risk of malnutrition but also to improve anastomotic healing.

Patients with severe postoperative complications such as gastric fistulas or anastomotic leakage may also require this type of access. Cancer cachexia is another common indication (Guenther et al., 2015).

Complications

Complications associated with nasogastric and nasojejunal tubes include accidental placement of the tube into the bronchial tree, nasal mucosal injury, and bleeding. During use, gastroesophageal reflux and aspiration into the respiratory tract may occur.

Serious mechanical injury to the nasal and nasopharyngeal mucosa is currently less common. To reduce the risk of complications, radiological confirmation of tube placement and insertion with the patient in a sitting position are recommended. The most common complications during nasogastric or nasojejunal feeding include accidental tube removal and tube occlusion by enteral formula residue, which may affect up to 45% of patients according to some studies.

Infectious complications are the most frequent adverse events associated with PEG placement. ESGE guidelines recommend the use of topical antiseptics and daily dressing changes in cases of mild wound infection, while systemic antibiotic therapy is required in more severe cases.

Buried bumper syndrome (BBS), characterized by pain at the PEG insertion site, occurs in up to 4% of patients and results from migration of the internal bumper into the gastric wall. Daily rotation and mobilization of the tube during routine care reduce the risk of this complication.

Approximately 2% of patients experience leakage of gastric contents around the gastrostomy site. Management includes treatment of predisposing conditions such as diabetes and the use of local absorbent dressings.

In surgical access, a common complication is leakage of intestinal contents around the stoma, which may lead to local soft-tissue inflammation. Treatment primarily involves proper stabilization of the feeding tube. Catheter displacement is a particularly common complication of microjejunostomy and may require radiological verification.

Cancer patients may also develop chronic osmotic diarrhea related to inappropriate osmolality of the enteral formula, excessively rapid feeding rates, or concomitant antibiotic therapy (Muscaritoli et al., 2021; Bartoszevska et al., 2023).

In clinical practice, the choice of enteral access is often influenced not only by strict medical indications but also by organizational and logistical factors. These include the availability of specialized equipment, the experience of the medical team, and the setting in which care is provided, such as inpatient versus home-based nutritional support.

Furthermore, patient-related factors, including general condition, prognosis, and expected quality of life, play an essential role in decision-making. In palliative care settings, the goal of enteral nutrition may shift from prolonging survival to improving comfort and maintaining functional status.

Technological advancements have significantly improved the safety and accessibility of enteral feeding methods. The development of minimally invasive endoscopic techniques, improved biomaterials, and standardized connector systems such as ENFit has contributed to reducing complications and enhancing patient safety.

Table 1. Comparison of the most commonly used methods of gastrointestinal access for enteral nutrition in adult oncology patients (own elaboration based on ESPEN and ESGE guidelines).

Method	Recommended duration of use	Clinical indications	Advantages	Common complications
NG (nasogastric tube)	< 4–6 weeks	Dysphagia; short-term nutritional support	Easy placement; no surgical procedure required; low cost	Aspiration; tube displacement; tube occlusion
NJ (nasojejunal tube)	< 4–6 weeks	High risk of aspiration; gastroparesis	Post-pyloric feeding; lower risk of aspiration	Tube displacement; tube occlusion
PEG / PEG-J	> 4 weeks	Dysphagia in esophageal and head & neck cancers	Stable access; suitable for long-term and home enteral nutrition	Site infection; buried bumper syndrome
Jejunostomy / NCJ	>4 weeks or intraoperative	Gastric obstruction; status post gastrectomy	Post-pyloric feeding; lower risk of aspiration	Catheter displacement; intestinal leakage

Abbreviations: NG – nasogastric tube; NJ – nasojejunal tube; PEG – percutaneous endoscopic gastrostomy; PEG-J – PEG with jejunal extension; NCJ – needle catheter jejunostomy.

Discussion

Nutritional therapy in cancer patients constitutes an integral component of comprehensive oncological care. Malnutrition and cancer cachexia represent significant clinical challenges that increase the risk of treatment-related complications and negatively affect both prognosis and quality of life.

When gastrointestinal function is preserved, enteral nutrition remains the preferred method of nutritional support due to its more physiological nature. It maintains the integrity of the intestinal barrier and is associated with a lower risk of metabolic complications compared with parenteral nutrition.

The selection of an appropriate enteral access method remains a complex clinical decision that requires consideration of multiple factors. These include not only anatomical and physiological conditions but also the anticipated duration of nutritional therapy and the patient's overall prognosis. In many cases, early planning of nutritional support allows for the prevention of severe malnutrition and improves tolerance to oncological treatment.

From a practical perspective, short-term access methods such as nasogastric and nasojejunal tubes are relatively easy to implement but are associated with a higher risk of displacement and patient discomfort. In contrast, long-term solutions such as PEG or jejunostomy provide more stable access but require procedural intervention and carry procedure-related risks.

An important aspect of enteral nutrition is the prevention and early recognition of complications. Proper training of healthcare personnel, including nurses and caregivers, plays a crucial role in minimizing adverse events. Regular monitoring of the insertion site, verification of tube position, and appropriate administration techniques significantly reduce the risk of both mechanical and infectious complications.

In recent years, increasing attention has been paid to the role of home enteral nutrition. Advances in medical technology and improved organization of healthcare services have enabled more patients to receive long-term nutritional support outside the hospital setting. This approach not only improves patient comfort but also reduces healthcare costs and the burden on hospital systems.

Interdisciplinary collaboration is another key element of effective nutritional therapy. The involvement of oncologists, surgeons, gastroenterologists, dietitians, and nursing staff ensures a comprehensive approach to patient care. Decision-making should be individualized and based on a thorough assessment of risks and benefits.

Despite the growing number of guidelines, there are still gaps in knowledge and variability in clinical practice. Differences in local protocols, availability of resources, and clinician experience may influence the

choice of access method. Therefore, further research is needed to standardize practices and improve outcomes in enteral nutrition for cancer patients.

Another important consideration is the ethical dimension of nutritional support, particularly in advanced stages of cancer. Decisions regarding the initiation or continuation of enteral nutrition should take into account patient preferences, expected benefits, and overall treatment goals.

Future developments in this field may include further improvements in biomaterials, enhanced safety features of enteral devices, and the integration of digital monitoring systems. Such innovations have the potential to further reduce complications and improve the quality of care provided to oncology patients.

Knowledge among physicians, nurses, and clinical dietitians regarding available medical devices enabling gastrointestinal access is essential in clinical practice. This knowledge is crucial not only for appropriate patient selection but also for the prevention and management of complications.

Modern medicine, in order to be fully effective, must recognize nutrition as an essential component of the therapeutic process. The choice of the optimal gastrointestinal access route should always be individualized and depend on the patient's clinical condition, the anticipated duration of nutritional therapy, and the experience of the medical center. Furthermore, reported complication rates may vary depending on the definitions used in individual studies.

The selection of enteral access methods reflects not only clinical decision-making but also the application of modern medical technologies and interdisciplinary collaboration within healthcare systems. The increasing availability of minimally invasive techniques such as PEG and DPEJ highlights the role of technological innovation in improving patient outcomes and optimizing nutritional therapy.

Additionally, the increasing complexity of oncological care highlights the need for standardized protocols in nutritional management. The integration of evidence-based guidelines into everyday clinical practice remains a challenge, particularly in settings with limited resources. Educational initiatives aimed at improving awareness and practical skills among healthcare professionals may contribute to better implementation of nutritional strategies. Strengthening the role of clinical nutrition within multidisciplinary teams may further enhance patient outcomes and ensure a more consistent approach to enteral access selection.

Conclusions

Enteral nutrition plays a crucial role in the management of cancer patients who are unable to meet their nutritional requirements through oral intake. Appropriate selection of gastrointestinal access is essential for effective nutritional therapy and the prevention of complications. The choice of access route should always be individualized and based on gastrointestinal function, anticipated duration of nutritional therapy, and the overall clinical condition of the patient. Increasing awareness and knowledge among healthcare professionals regarding nutritional therapy may significantly improve treatment outcomes and quality of life in oncology patients.

Conflict of Interest: No conflicts of interest to declare.

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